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EXAMINER	
MILORD, MARCEAU	
ART UNIT	**PAPER NUMBER**
2682	4

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/034,386	SHATTIL, STEVE J.
	Examiner	Art Unit
	Marceau Milord	2682

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Proakis et al (US Patent No 5844951) in view of Thomas et al (US Patent No 6141393).

Regarding claim 1, Proakis et al discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals comprising: providing for transformation of an input signal that includes the plurality of interfering signals into a plurality of spectral components, the spectral components having complex amplitudes corresponding to unique complex amplitude-versus-frequency profiles for each of the interfering signals (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the steps of providing for computation of a set of weights with respect to the complex amplitude-versus frequency profiles,

providing for application of said weights to said spectral components, and providing for combining the weighted spectral components to cancel co-channel interference.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 2, Proakis et al as modified discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals, wherein the input signal

includes samples of at least one of a set of signals including a spread-spectrum signal, a multicarrier signal, code division multiple access signal, a discreet-time signal, and a continuous-time signal (col. 2, line 45- col. 3, line 66; col. 12, line 3- col. 13, line 46).

Regarding claim 3, Proakis et al as modified discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals, wherein step of transforming the discreet-time input signal into the plurality of spectral components includes decoding at least one multicarrier signal in the input signal, the multicarrier signal characterized by a plurality of carriers each having a different spreading code (col. 12, line 43- col. 13, line 46; col. 15, line 38- col. 16, line 58).

Regarding claim 4, Proakis et al discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals comprising: providing for transformation of a discreet-time input signal into a plurality of spectral components, the discreet-time input signal including the plurality of interfering signals, the spectral components having differences in either or both amplitude variations and phase variations (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the steps of providing for separation of the interfering signals by processing either or both the amplitude variations and the phase variations of the plurality of spectral components.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The

method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 5, Proakis et al as modified discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals, wherein the step of providing for separation of the interfering signals includes a constellation processing method (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

Regarding claim 6, Proakis et al as modified discloses a method for using frequency diversity to spatial demultiplex a plurality of interfering signals, wherein the step of providing, for transformation of a discreet-time input signal includes deriving at least one discreet-time input signal from a plurality of received signals, the received signals being transmitted signals

that have propagated in a free-space or guided-wave environment after being transmitted by a plurality of transmitters (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

Regarding claim 7, Proakis et al discloses a method of using complex amplitude versus diversity parameter values to perform spatial demultiplexing of interfering signals comprising: providing for transformation of a receive signal into a plurality of diversity components, the receive signal including a plurality of the interfering signals (col. 2, line 45- col. 3, line 66; col. 15, line 20- col. 16, line 61).

However, Proakis et al does not specifically disclose the features of the diversity components having differences in either or both amplitude distributions and phase distributions, and providing for separation of the interfering signals by processing either or both the amplitude variations and the phase variations of the plurality of diversity components.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers

and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 8, Proakis et al as modified discloses a method of using complex amplitude versus diversity parameter values to perform spatial demultiplexing of interfering signals, wherein the step of providing for transformation includes polarization processing and the diversity components include polarization-diversity components (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

Regarding claim 9, Proakis et al as modified discloses a method of using complex amplitude versus diversity parameter values to perform spatial demultiplexing of interfering signal, further comprising providing for adjusting at least one spatial gain distribution of at least one of the received signals (col. 2, line 45- col. 3, line 66).

Regarding claim 10, Proakis et al as modified discloses a method of using complex amplitude versus diversity parameter values to perform spatial demultiplexing of interfering signals, wherein the step of adjusting spatial gain distributions includes adjusting spatial gain distribution characteristics of at least one of a plurality of transmitted signals (col. 2, line 45- col. 3, line 66;col. 15, line 20- col. 16, line 61).

Regarding claims 11-12, Proakis et al discloses an apparatus capable of spatially separating a plurality of interfering information-bearing received signals, each of the received signals having a different amplitude-versus-frequency profile, the apparatus including: at least one diversity receiver adapted to separate the received signals into a plurality of frequency components, and at least one spatial interferometry demultiplexer adapted to process the frequency components to separate at least one information signal from at least one interfering signal.(col. 2, line 45- col. 3, line 66;col. 15, line 20- col. 16, line 61).

However, Proakis et al does not specifically disclose the features of a combining unit adapted to provide weighting and combining of the plurality of received signals using the generated plurality of weights to enhance signal to interference of at least one of the received signal by canceling interfering signals

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers

and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 13, Proakis et al discloses a method of producing diversity-encoded spread-spectrum signals comprising: providing for generation of at least one wideband electromagnetic signal, providing for impressing an information signal onto the at least one wideband signal to produce at least one spread-spectrum signal (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the steps of providing for duplicating the spread-spectrum signal to generate a plurality of spread-spectrum signals, and providing for diversity-encoding of a1 least one of the spread-spectrum signals.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined

basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 14, Proakis et al as modified discloses a method of producing diversity-encoded spread-spectrum signals, wherein the step of providing for diversity encoding includes at least one item of a set of providing a time offset, polarizing, applying a predetermined directionality, transmitting from a plurality of spatially separated transmitters, modulating with a predetermined carrier frequency, combining with a carrier having a predetermined mode, and transmitting the spread-spectrum signals in at least one predetermined subspace channel (col. 2, line 45- col. 3, line 66; col. 12, line 43- col. 13, line 46).

Regarding claim 15, Proakis et al discloses a method of producing diversity-encoded spread-spectrum signals comprising: providing for generating at least one information-bearing wideband radio signal, providing for generating at least one decoding signal (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the steps of providing for diversity-encoding of at least one of the information-bearing wideband signal and the decoding signal.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 16, Proakis et al as modified discloses a method of producing diversity-encoded spread-spectrum signals, wherein the step of providing for diversity encoding includes

at least one item of a set of providing a time offset, polarizing, applying a predetermined directionality, transmitting from a plurality of spatially separated transmitters, modulating with a predetermined carrier frequency, combining with a carrier having a predetermined mode, and transmitting the signals in at least one predetermined subspace channel (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

Regarding claim 17, Proakis et al discloses a spread-spectrum transmitter capable of transmitting diversity-coded spread-spectrum radio signals the transmitter comprising: a wideband-signal generator adapted to generate at least one wideband signal, an information signal generator adapted to generate at least one information signal, a modulator coupled to the wideband signal generator and the information signal generator, the modulator adapted to combine at least one information signal with at least one wideband signal for generating at least one spread-spectrum signal (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46;col. 15, line 20- col. 16, line 61).

However, Proakis et al does not specifically disclose the features of a diversity processor adapted to duplicate the at least one spread-spectrum signal to provide a plurality of duplicate spread-spectrum signals and adjust at least one diversity parameter of at least one of the duplicate spread-spectrum signals to enable separation of the adjusted signal from the at least one unadjusted signal.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The

method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 18, Proakis et al discloses a spread-spectrum transmitter capable of transmitting spread-spectrum coded, diversity-coded signals, the transmitter comprising: a wideband-signal generator adapted to generate at least one wideband radio signal, an information signal generator adapted to generate at least one information signal, a modulator coupled to the wideband signal generator and the information signal generator, the modulator adapted to combine at least one information signal with at least one wideband signal for generating at least one spread-spectrum signal (col. 2, line 45- col. 3, line 66;col. 15, line 20- col. 16, line 61).

However, Proakis et al does not specifically disclose the features of a diversity processor adapted to adjust at least one diversity parameter of at least one of the spread-spectrum signal and the wideband signal to enable separation of the adjusted signal from the at least one unadjusted signals.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 19, Proakis et al discloses a spread-spectrum receiver capable of extracting an information signal from a plurality of diversity coded spread-spectrum radio signals, the receiver comprising: a receiving system adapted to receive the diversity-coded spread-spectrum signals, a diversity processor coupled to the receiving system, the diversity processor adapted to diversity decode at least one of the received signals to provide a plurality of signals that are highly correlated (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the features of a signal combiner coupled to the diversity processor, the signal combiner adapted to correlate or otherwise combine the plurality of highly correlated signals to generate a correlation signal indicative of the information signal.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix

at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 20, Proakis et al discloses a spread-spectrum receiver capable of extracting an information signal from at least one diversity coded spread-spectrum radio signal, the receiver comprising, a receiving system adapted to receive, the at least one diversity-coded signal and receive at least one dispreading signal, the received dispreading signal being separable from the at least one spectrum-coded signal, a diversity processor coupled to the receiving system (col. 2, line 45- col. 3, line 66; col. 15, line 20- col. 16, line 61).

However, Proakis et al does not specifically disclose the features of a diversity processor adapted to diversity decode at least one of the received signals to generate a plurality of signals that are highly correlated, and a signal combiner coupled to the diversity processor, the signal combiner adapted to correlate or otherwise combining the plurality of highly correlated signals to generate a correlation signal indicative of the information signal.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device

at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Regarding claim 21, Proakis et al discloses a receiver capable of receiving and separating a plurality of information signals, the receiver including: a sampler adapted to sample received information signals to produce at least one algebraically unique combination of information signals (col. 2, line 45- col. 3, line 66;col. 12, line 43- col. 13, line 46).

However, Proakis et al does not specifically disclose the features of a nonlinear processor adapted to apply a nonlinear process to at least one signal of the algebraically unique combination of information signals to increase the number of combinations, and a multi-user detector adapted to provide information about at least one of the information signals in order to calculate at least one information-signal value.

On the other hand, Thomas et al, from the same field of endeavor, discloses a method and device in a communication system including a receiver having a plurality of receiving antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols and a pilot symbol sequence. The method provides for computing a channel transfer function between the transmitting user device at each of the plurality of receiving antennas, by computing a simulated received pilot signal for each receiving antenna, and computing the channel transfer function by weighting predetermined basis functions by the channel modeling sequence (col. 4, line 40- col. 5, line 54; col. 7, line 3- col. 8, line 25; col. 9, line 38- col. 10, line 55). Furthermore, Thomas shows in figure 11, a method for computing the combining weights in the antenna combiner. The estimates of the external interference plus noise signals are averaged over a predetermined block of sub carriers and times to compute an estimate of the external interference plus noise spatial covariance matrix at each sub carrier and time. In addition, the channel transfer function estimates for each desired transmitter on each sub carrier can be used to find weights that cancel out known interference and possibly external interference (figs. 2-5; figs. 8-11; col. 17, line 60- col. 18, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Thomas to the system of Proakis in order to reduce co-channel interference, improve coverage quality, and increase overall system capacity.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Youssefmir et al US Patent No 6141567 discloses an apparatus and method for adaptively producing transmitted signals and producing received signals in a communication system which includes smart antenna array of antennas elements.

Thomas et al US Patent No 6141393 discloses a method and device in a communication system including a receiver having a plurality of receivers antennas for receiving a plurality of information bursts transmitted by at least one transmitting user device where the information bursts contain a number of data symbols.

Yun et al US Patent No 5886988 discloses a channel assignment and call admission control for spatial division multiple access communication systems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marceau Milord whose telephone number is 703-306-3023. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian C. Chin can be reached on 703-308-6739. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Examiner

Art Unit 2682